

Restoring Iraq's National Water Resources Management Capability



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Dokan Dam

HEC Assistance to MoWR

**Iraq Marsh Restoration Project - IMRP;
Strategic Water and Land Resources in Iraq -
SWLRI ;**

USAID/DAI supported

**Capacity Building for Ministry of Water
Resources;**

- Training – water management, gaging system restoration, data acquisition, and modeling model, creation.
- Water management system model creation, with ongoing expansion and refinement.
- Baseline flow data preparation (unimpaired, current, and a projected future).

PCO supported

The California of the Middle East

■ Iraq

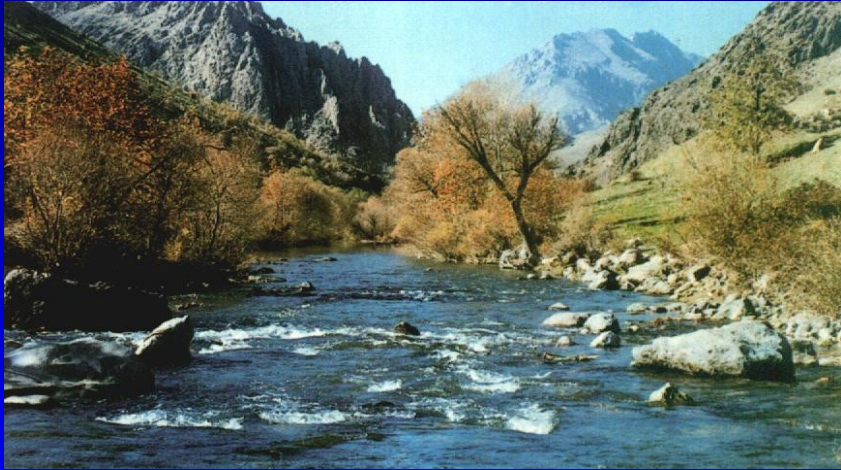
- Area: 437072 km²
- Latitude: 30°N to 38°N
- Population: 25 million

■ California

- Area: 264,044 km²
- Latitude: 33°N to 42°N
- Population: 35 million



Similarities



Source in North

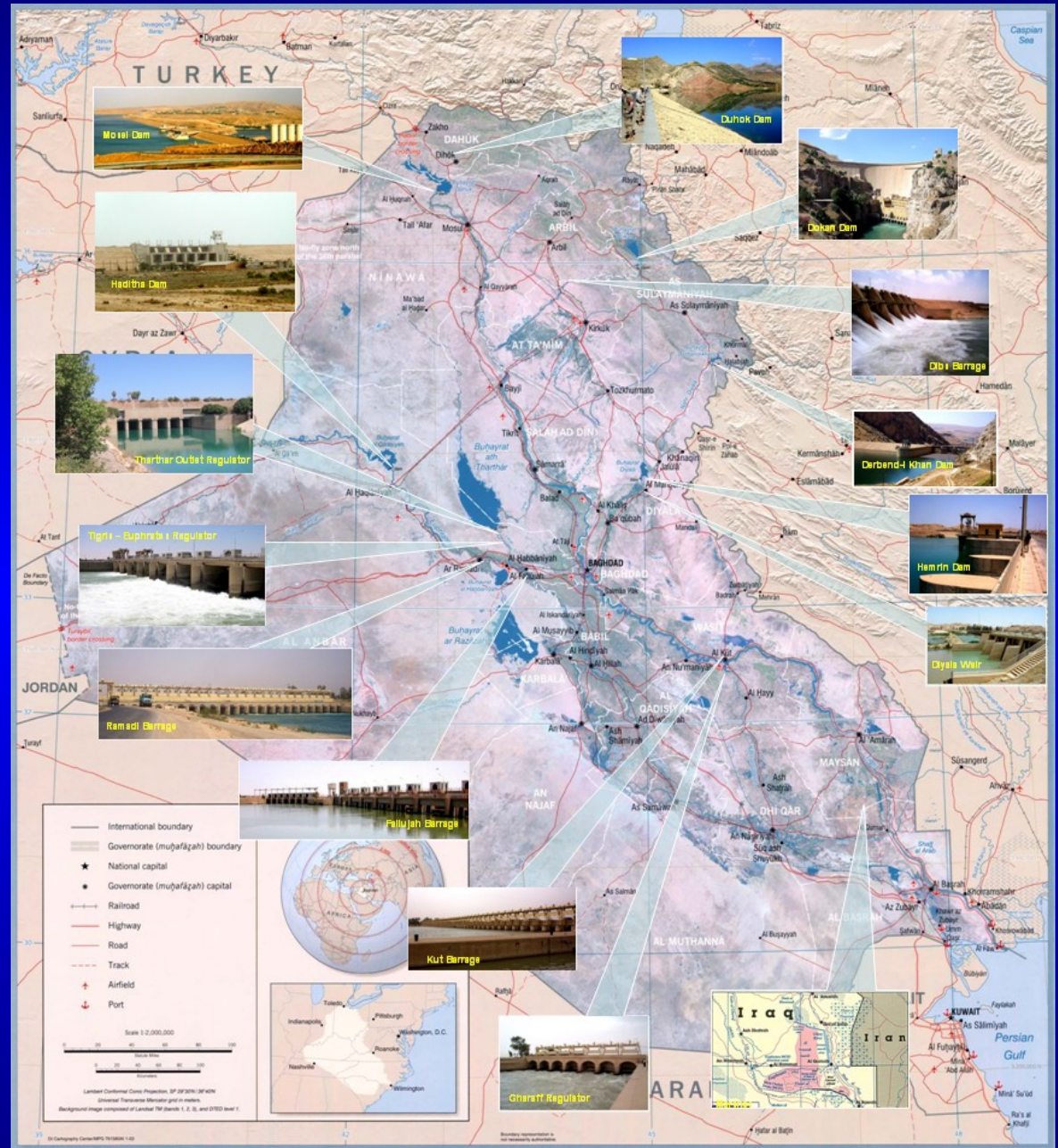


Demand in South

- Close hydrologic similarities
 - Rain, snow in mountains
 - Two rivers flow through flat arid valley, join in a delta
- Iraq in 1980's was much like California in the 1960's
 - Complex storage and distribution system still under construction
 - Similar climate, precipitation timing (Nov.- Mar.)
 - Significant agricultural potential
 - High priority on water conservation and efficient management, including decreasing agriculture use through better on-farm practices.

Complex Water Management

- 8 major storage dams, (including Tharthar and Habbaniyah), with another large dam under construction
- 12 large barrages for irrigation projects
- 275 irrigation pump stations
- Produce 17%+ of Iraq's electricity
- 27,000 km of irrigation channels
- 3.25 million hectares irrigated
- Historical marsh regions at confluence of Tigris and Euphrates

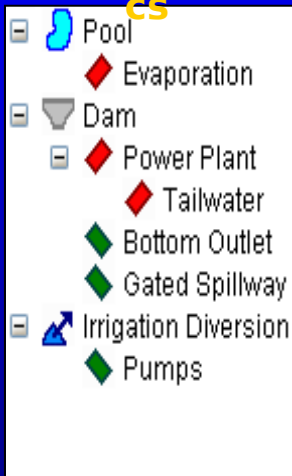


HEC-ResSim

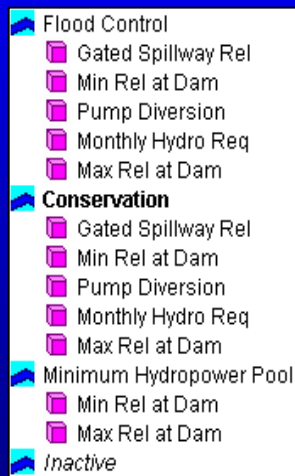
Reservoir Analysis System

- Rule-based, multi-purpose, seasonal reservoir operation
- Hydrologic routing in complex network of interconnected reservoirs, river reaches, and control points
- Flow continuity through the system

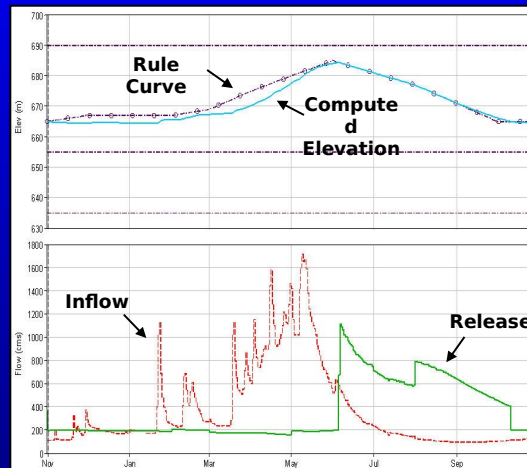
Physical Characteristics



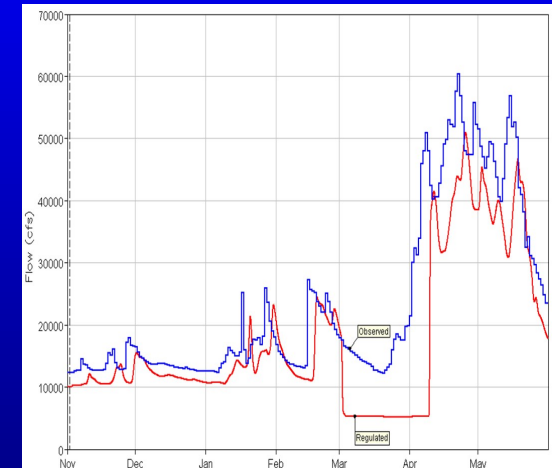
Operational Criteria



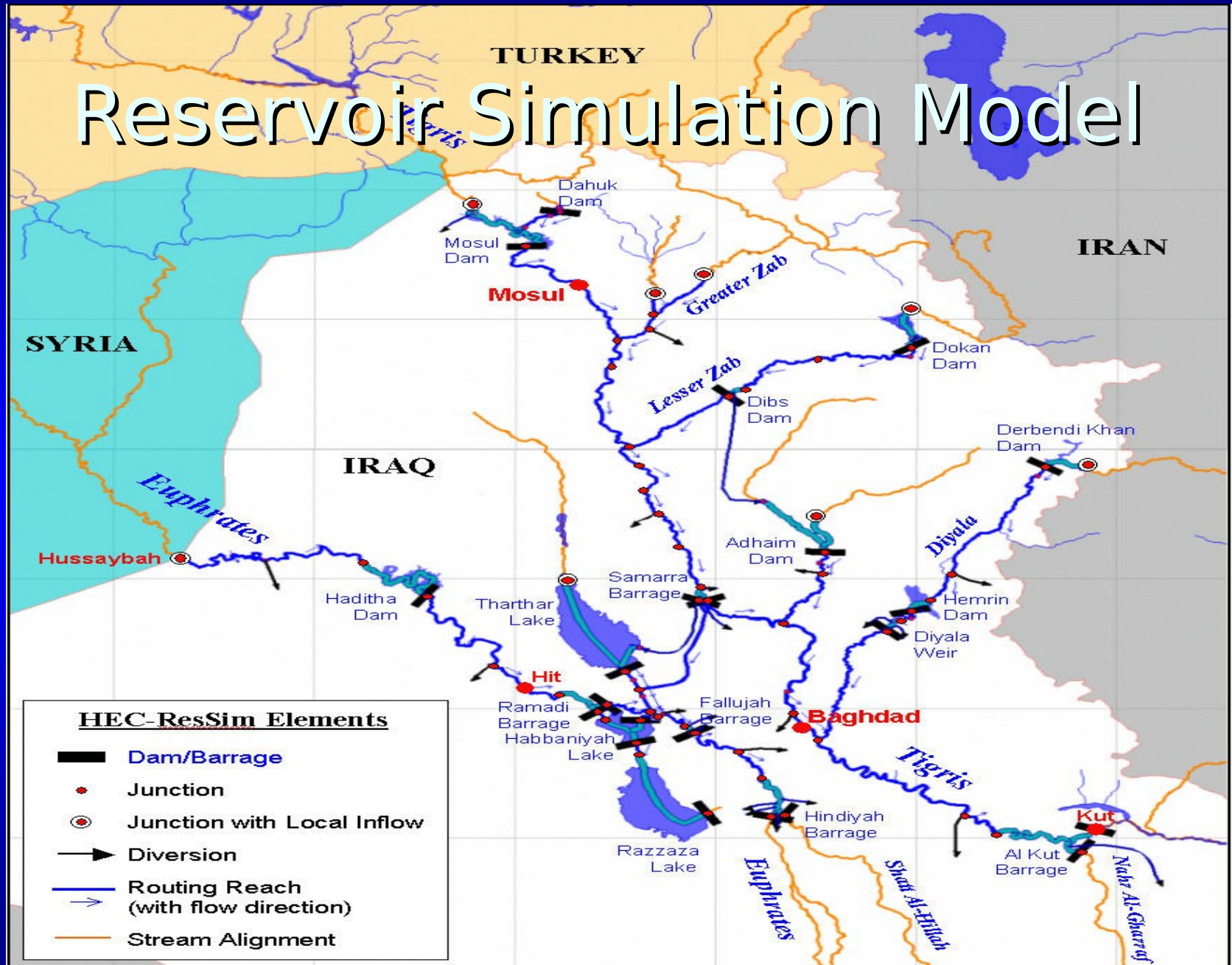
Reservoir Simulation



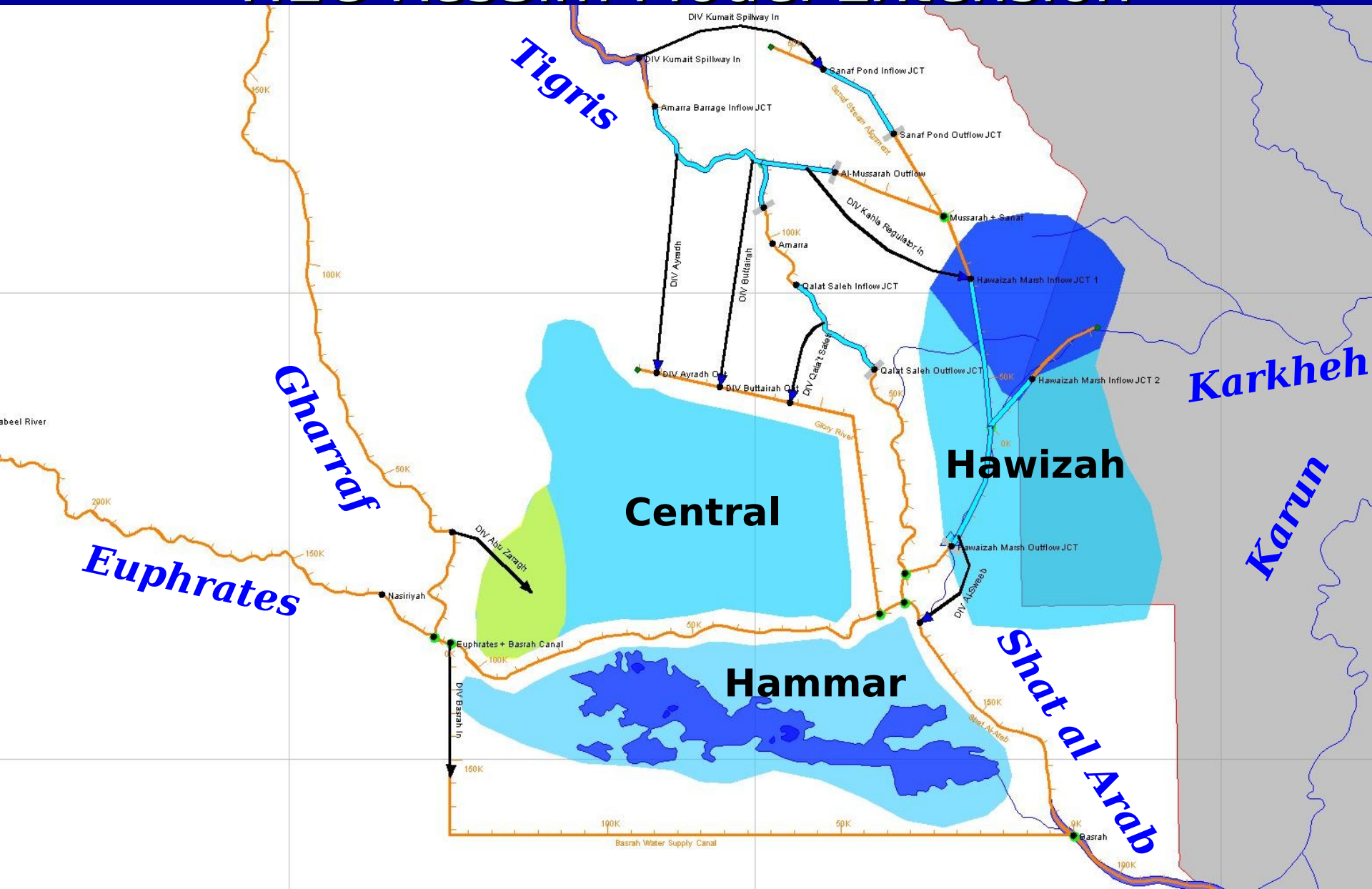
Downstream Flow



Reservoir Simulation Model



Coordination with Marsh Modeling HEC-ResSim Model Extension



Streamflow Gage Renovations

Catching Up the Last 25 Years



USAID 335600044560000 LESSER ZAB RIVER NEAR DOKAN, IRAQ
PROVISIONAL DATA SUBJECT TO REVISION

Available data for this site Real-time GO



Lesser Zab River near Dokan, Iraq. -- file photo

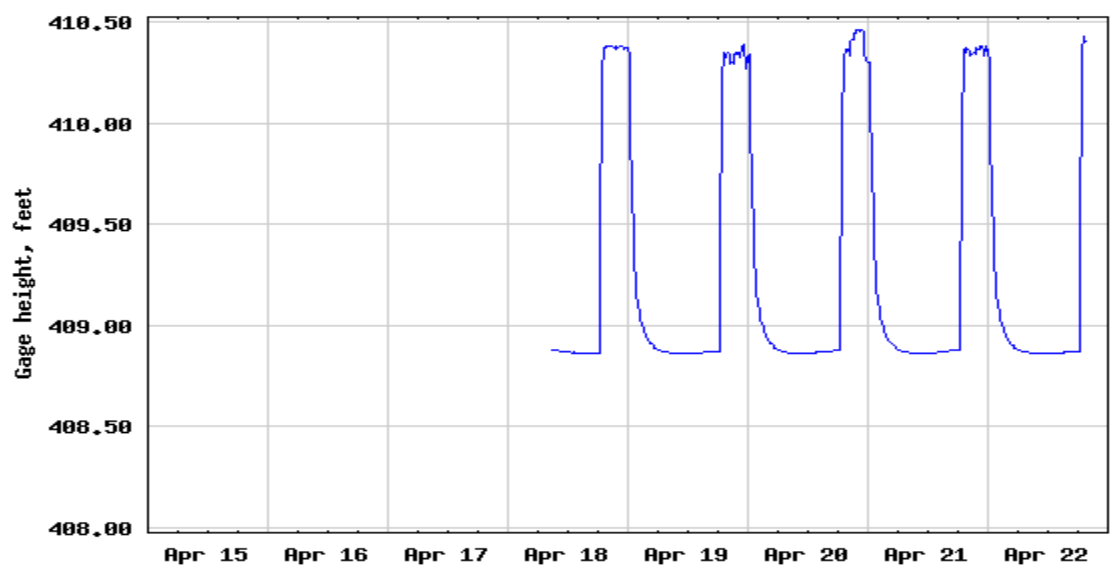
Available Parameters
All 2 parameters available at this site
00065 Gage height (DD 01)
70969 DCP battery voltage (DD 02)

Output format
Fixed-width table

Days
7
(1-31)

Date / Time	Gage height, feet (01_00065)	DCP battery voltage volts (02_70969)
04/18/2006 08:45	408.88	
04/18/2006 09:00	408.88	
04/18/2006 09:15	408.88	
04/18/2006 09:30	408.88	
04/18/2006 09:45	408.88	
04/18/2006 10:00	408.88	13.7
04/18/2006 10:15	408.87	
04/18/2006 10:30	408.87	
04/18/2006 10:45	408.87	
04/18/2006 11:00	408.87	13.6
04/18/2006 11:15	408.87	
04/18/2006 11:30	408.87	
04/18/2006 11:45	408.87	
04/18/2006 12:00	408.87	13.8
04/18/2006 12:15	408.87	
04/18/2006 12:30	408.87	
04/18/2006 12:45	408.86	
04/18/2006 13:00	408.87	13.5
04/18/2006 13:15	408.86	
04/18/2006 13:30	408.86	
04/18/2006 13:45	408.86	
04/18/2006 14:00	408.86	14.3
04/18/2006 14:15	408.86	
04/18/2006 14:30	408.86	
04/18/2006 14:45	408.86	
04/18/2006 15:00	408.86	12.8
04/18/2006 15:15	408.86	
04/18/2006 15:30	408.86	
04/18/2006 15:45	408.86	
04/18/2006 16:00	408.86	13.4

USAID 335600044560000 LESSER ZAB RIVER NEAR DOKAN, IRAQ



Provisional Data Subject to Revision

Data Collection

DAILYR-1.DOC - Microsoft Word

File Edit View Insert Format Tools Table Window Help Type a question for help

75%

Daily River Gauge Reading for Euphrates River in Kralba (Husiba) for the year 1981

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.
1	918	880	910	1299	1299	1372	1253	979	850	821	821	491
2	880	865	1064	1346	948	1170	1338	986	979	757	721	514
3	865	680	1121	1399	1236	1372	1278	971	1033	721	603	519
4	843	714	1145	1261	1244	1372	1278	873	1112	694	591	532
5	728	792	1121	1170	1261	1372	1253	933	1057	714	569	523
6	628	843	1170	1299	1299	1355	1104	1096	925	694	569	564
7	694	895	1195	1186	1329	1364	1195	1096	821	653	564	548

Page 1 Sec 1 1/17 At 1" Ln 1 Col 1 REC TRK EXT OVR

Adobe Reader

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Save a Copy Search Select 42%

our2-3A.pdf

Microsoft Excel - Copy of Haditha Dam Water Data Since 15

File Edit View Insert Format Tools Data Window Help

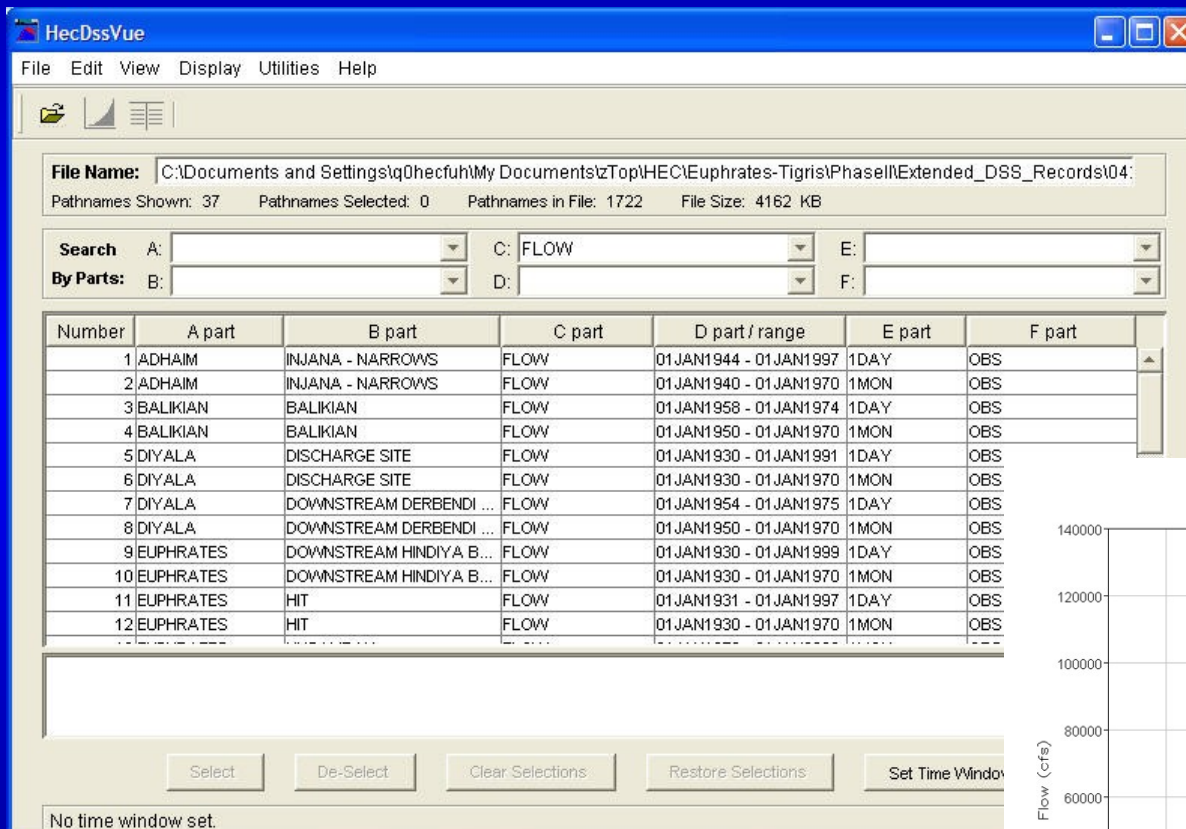
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Water Data for Haditha Dam Reservoir storage / 1985

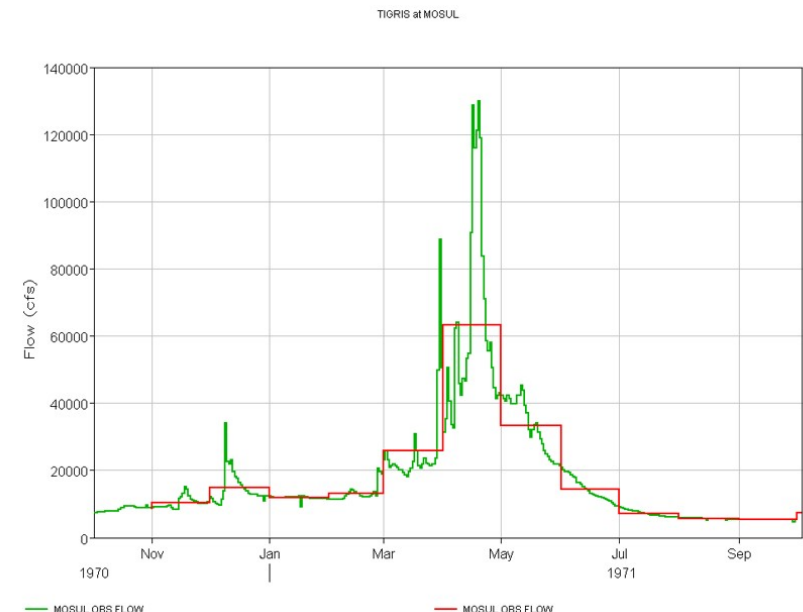
DATE	ELEV.	IN PUT	OUT PUT	D.S
5/1/1985	105.88		460	
5/2/1985	107.11		445	
5/3/1985	107.54		740	
5/4/1985	107.67		575	
5/5/1985	108.38		490	
5/6/1985	109.21		520	
5/7/1985	109.58		560	
5/8/1985	109.95	503	527	
5/9/1985	110.35	545	545	
5/10/1985	110.66	745	737	
5/11/1985	111.14	771	771	
5/12/1985	111.96	1062	1050	
5/13/1985	112.77	1042	375	
5/14/1985	113.76	1070	390	
5/15/1985	114.58	724	400	

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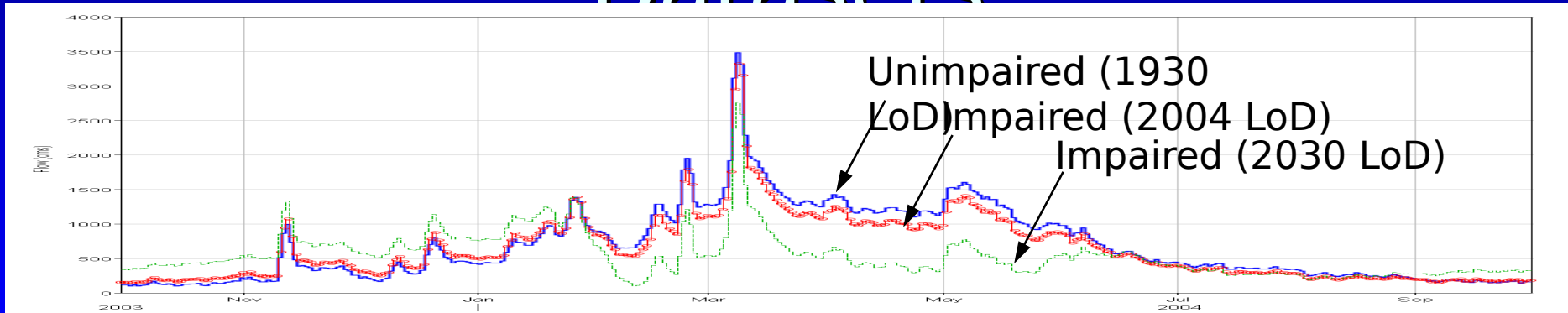
Tigris-Euphrates Database



- HEC-DSSVue archived records of observed:
 - Stream flows
 - Reservoir elevations

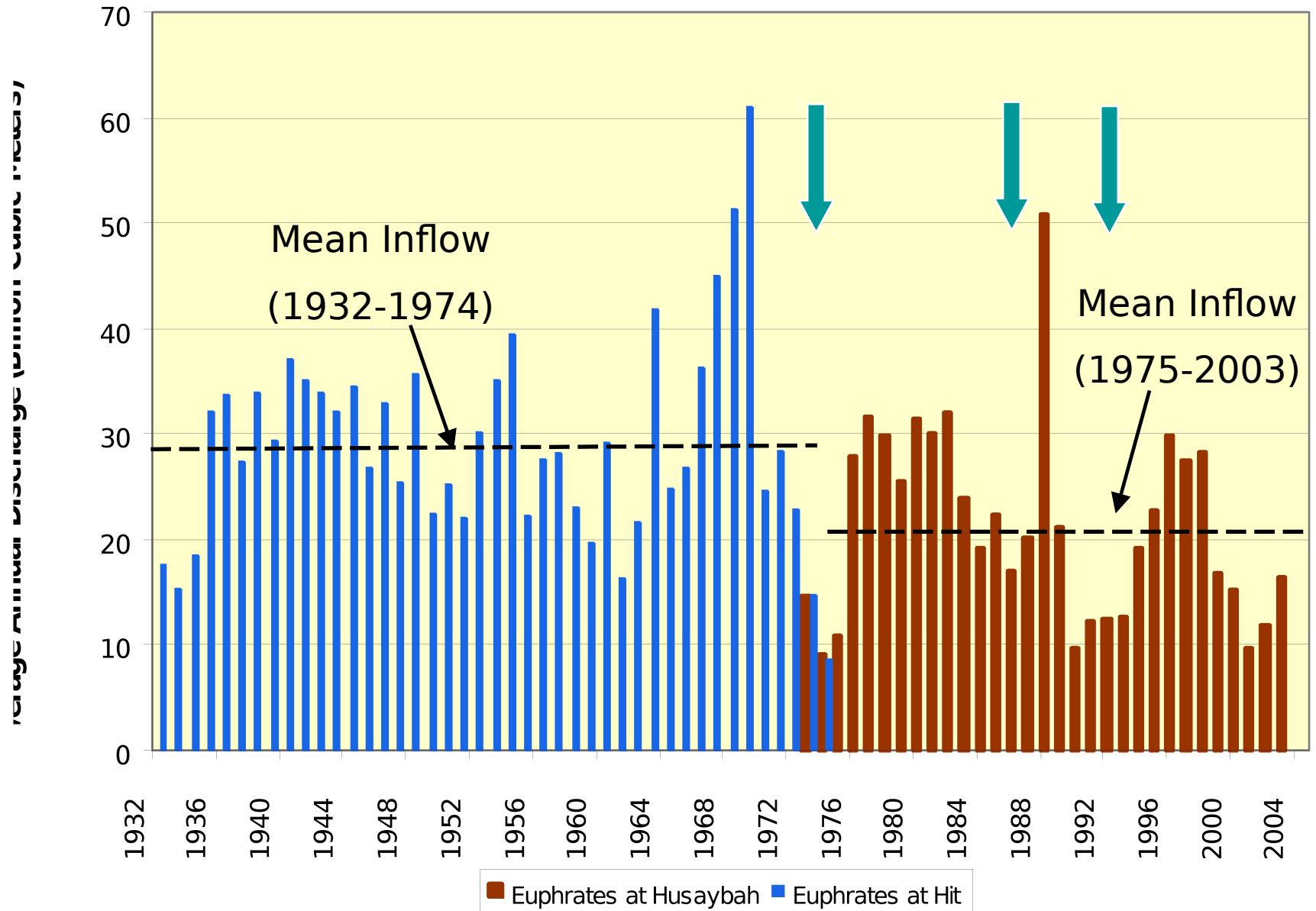


Upstream Reservoir Inflow Datasets



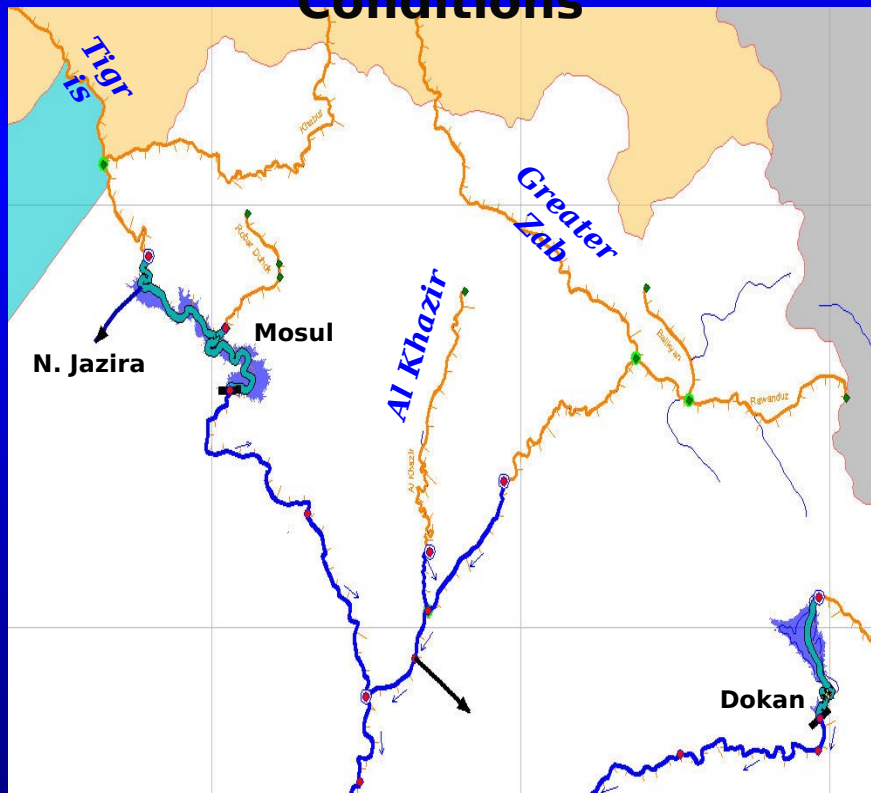
- 1930-2004 period of record flows adjusted to reflect past, current, and future levels of development (LoD) in the Tigris and Euphrates river basins:
 - 1) **Unimpaired 1930 LoD** – baseline conditions dataset “naturalized” to the level of basin development that existed in year 1930
 - 2) **Impaired 2004 LoD** – existing conditions dataset adjusted from baseline conditions using estimated impairments that account for the effects of present basin development
 - 3) **Impaired 2030 LoD** – future conditions dataset adjusted from baseline conditions using estimated impairments that account for the effects of basin development planned for full implementation in the future

Euphrates Inflow to Iraq (1932-2003)

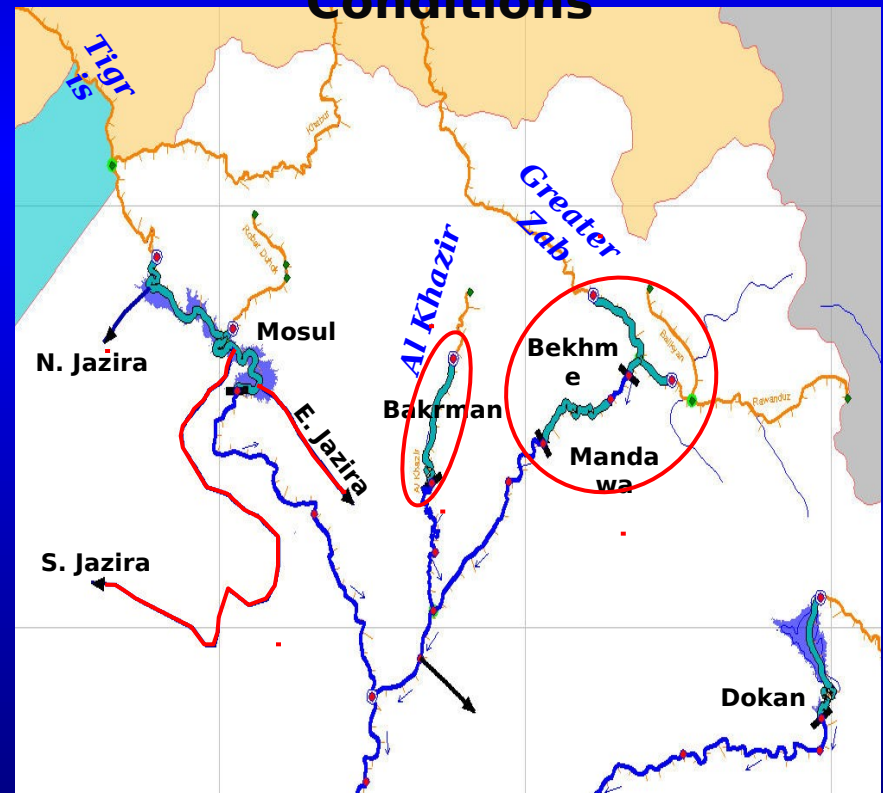


Basin Conditions Simulations

**Existing
Conditions**



**Future
Conditions**



Opportunities

- MoWR is well-positioned
 - very dedicated staff, takes great pride in the projects and history of organization
 - Primarily a technocracy – somewhat resistant to shifting politics
 - Eager to assimilate new engineering and business tools and processes with encouraging rates and degrees of success
- Water projects popular with International donors
 - Several American outreach efforts – USAID, PCO
 - UNESCO, World Bank, Italy, Japan, others
- Longer working relationships providing extra traction for capacity building
 - Trust and understanding already in place
 - No need to learn the ropes again



Summary

- Water management in Iraq and the Euphrates-Tigris basin is as complex as anywhere in the world.
- The natural resource is already stressed. Turkey controls of about 70% of flow of Euphrates-Tigris, and has its own plans for development.
- Projects can be operated more efficiently to make the best use of the water available.
- Allocating the storage to meet various demands requires a model with the sophistication of HEC-ResSim.
- Most important study issues require extensive analysis of the streamflow record to support the modeling.
- The MoWR considers this work as one of its own primary missions. Success consists of building the capacity to perform such analyses within the MoWR.





Thanks for listening!